

REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application.

Claims 1-13 are now present in this application. Claim 1 is independent. Claim 5 has been amended.

Reconsideration of this application is respectfully requested.

Objection to the Drawings

The Examiner has objected to the Drawings under 37 CFR §1.83(a) for allegedly not showing the sensing unit combining the output signal of the squid and the magnetic field generated by a second feedback coil, as recited in claim 5. Applicants respectfully traverse this objection.

Applicants respectfully submit that the structural details of a sensor that combines the output signal of the SQUID and a magnetic field generated from a second feedback coil (separate feedback coil 11, for example) is shown in Applicants' Fig. 2.

Accordingly, reconsideration and withdrawal of this objection are respectfully requested.

Rejection Under 35 U.S.C. § 112, 2nd Paragraph

Claim 5 is rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential elements, citing MPEP §2172.01. This rejection is respectfully traversed.

Applicants thank the Examiner for the suggested amendment to claim 5 to overcome this rejection. Claim 5 has been amended as suggested by the Examiner.

Accordingly, reconsideration and withdrawal of this rejection of claim 5 is respectfully requested.

Rejection Under 35 U.S.C. § 102

Claims 1, 2 and 6-11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,339,328 to Keene et al. ("Keene"). This rejection is respectfully traversed.

A complete discussion of the Examiner's rejection is set forth in the Office Action, and is not being repeated here.

Claims 1, 2 and 6-11 positively recite a combination of features including an auxiliary sensor having a lower magnetic sensitivity and a higher operating range than the SQUID sensing unit.

Applicants are unable to find this positively recited feature in Keene, either explicitly or inherently. Applicants' review of Keene indicates that Keene never mentions any difference between the sensitivities of its SQUID sensors, e.g., sensors 25a and 25b.

Moreover, while Keene indicates that magnetometers 25a, 25b are represented as SQUID magnetometers, other magnetometer devices may be used, for example, flux gate, Hall probe sensors, or magneto-resistive devices – see col. 6, lines 19-22, and col. 11, lines 54-58, there is no teaching in Keene that one sensor can be one type of magnetometer device and the other sensor can be a different type of magnetometer device.

Any assertion that a first magnetic sensor is a SQUID type device and an auxiliary magnetic sensor is a flux gate type device is speculation unsupported by objective factual evidence in Keene. Applicants contend that any disclosure in Keene of a fluxgate as the auxiliary sensor is only in the context of the other sensor being a flux gate sensor also.

The outstanding Office Action does not explicitly discuss these arguments, which were previously presented by Applicants but, instead, concludes that Keene's col. 3, lines 9-13 and col. 11, lines 47-65 explicitly discloses that "at least one of the sensors may be a fluxgate, a hall probe or an MR sensor." Applicants respectfully disagree. A teaching that at least one of the sensors may be one of four

different specific types of magnetic sensors does not necessarily mean that both of the sensors are different specific types of sensors.

It continues to be Applicants' position that there is no explicit disclosure by Keene of the claimed squid sensor and an auxiliary fluxgate sensor nor is there any inherent (i.e., necessarily disclosed) disclosure of such a feature.

Furthermore, Keene does not operate the SQUID sending unit and the auxiliary sensor to read out a signal of the SQUID, as recited in all of the claims. Instead of doing what is recited, Keene separately operates sensor 25a to read out signals of sensor 25a and separately operates sensor 25b to read out signals of sensor 25b.

This last argument, which was previously presented in the Amendment filed on May 23, 2005, is not addressed in the outstanding Office Action, contrary to the requirements of MPEP § 707.07(f).

Accordingly, Applicants respectfully submit that Keene does not anticipate the invention recited in claims 1, 2 and 6-11.

Furthermore, with respect to claim 6, Applicants respectfully submit that Keene does not provide a maximum value of the magnetic field sensed by the auxiliary sensor with a signal value of the SQUID generated by an operation of the SQUID sensing unit. As shown in Fig. 5, Keene generates an integral value using integrators 28a and 28b, not a maximum value.

With respect to claim 7, Applicants respectfully submit that Keene does not disclose a second combiner to output a noise-eliminated signal, as recited. All that Keene discloses is the use of two sets of nested feedback loops to achieve low noise and fine resolution for the purposes of measuring field gradient, while providing sufficient dynamic range in an outer global feedback loop to handle the earth's magnetic field - see col. Col. 12, lines 6-10 of Keene. Keene's ASPA is simply not disclosed, either explicitly or inherently, as a second combiner to output a noise eliminated signal.

In reply to this argument, the outstanding Office Action refers to the ASPA as the recited combiner. However, Applicant respectfully submits that Keene's ASPA is only disclosed as combining the outputs of the two magnetometers into a linear combination - see col. 8, lines 20-23. Applicants have not found a disclosure in Keene that ASPA outputs a noise-eliminated signal. Noise elimination is not a disclosed feature of Keene's ASPA.

With respect to claims 8 and 9, the Office Action relies on a large portion of Keene, namely from col. 7, line 66 to col. 8, line 67, to allegedly disclose a second combiner allowing signals from the SQUID and auxiliary sensors in a predetermined ratio to eliminate noise in the signal.

Applicant can find no mention in Keene of a "ratio" or of a second combiner to output a noise eliminated signal, and the Office Action does not point out specific words in the two-plus columns of Keene relied on that disclose

such features, either explicitly or inherently. Moreover, the Office Action merely speculates about the existence of the ratio recited in claim 9 being disclosed in Keene, rather than providing objective factual evidence of its existence in Keene. This is improper.

In reply, the outstanding Office Action additionally refers to the linear equation of col. 8, line 23. However, Applicants still do not see how that equation concerns the recited predetermined ratio, and the Office Action never explains how that equation discloses a predetermined ratio, as recited.

With respect to claim 10, as pointed out above, Keene does not disclose an auxiliary sensor of a different type than the SQUID sensor, so the allegation that Keene discloses a flux gate pick-up coil as a secondary sensor with a SQUID sensor is based on speculation and not on objective factual evidence that Keene explicitly or inherently discloses such a feature.

Accordingly, this rejection of claims 1, 2 and 6-11 is improper and should be withdrawn.

Claims 1 and 10 stand rejected under 35 USC §102(b) as anticipated by the article written by Brake et al. ("Brake"). This rejection is respectfully traversed.

Applicants respectfully submit that Brake does not disclose a sensor-reading unit as recited. Although it is not clear, it appears that the Office Action

is assuming that Brake's 15-turn coil noise-reference sensor that is disclosed as being coupled to an RF SQUID system is the first feedback coil of the SQUID. However, Brake disclosed, on page 599, first paragraph, left column, that the amplified output of the SQUID system was fed back to two 11-turn coils, i.e., not to the 15-turn coil feedback coil. Accordingly, Brake does not disclose the invention recited in claims 1 and 10, which recites supplying the SQUID sensing unit with an offset magnetic field through the first feedback coil.

Reconsideration and withdrawal of this rejection of claims 1 and 10 is respectfully requested.

Rejections under 35 U.S.C. § 103

Claim 12 stands rejected under 35 U.S.C. §103(a) as unpatentable over Keene in view of U.S. Patent 5,343,707 to Sata. This rejection is respectfully traversed.

Keene admittedly does not disclose the features of a refrigeration unit to cool SQUID sensors. To remedy this defect, the Office Action turns to Sata, which discloses a cyclic noise removing system for a magnetic sensor. Sata's SQUID gradiometer B includes a SQUID 31 and magnetic flux input circuitry 32 disposed on a final cooling stage of a cryogenic refrigerator that includes plural cooling stages. The magnetic flux input circuitry includes a pickup coil 33

having four loops and being wound in a loop shape to a cylindrical bobbin 34.
See col. 9, lines 1-15, for example.

Sata is not applied to remedy the shortcomings of Keene. Accordingly, even if it were obvious to modify Keene to provide the recited refrigeration features, the modified version of Keene would not render obvious the invention of claim, which includes the features of claim 1, which patentably defines over Keene for reasons discussed above.

Accordingly, the Office Action fails to make out a *prima facie* case that the proposed modification of Keene in view of Sata would result in, or render obvious, the claimed invention.

Withdrawal of this rejection of claim 12 is respectfully requested.

Allowable Subject Matter

Applicants acknowledge with appreciation the indication that claims 3, 4 and 13 contain allowable subject matter. However, because Applicants believe that claim 1, from which claims 3, 4 and 13 depend, is allowable over the applied art, Applicants have not re-written claims 3 and 4 in independent form.

Additional Cited References

Because the remaining references cited by the Examiner have not been utilized to reject the claims, but have merely been cited to show the state of the art, no comment need be made with respect thereto.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Robert J. Webster, Registration No. 46,472, at (703) 205-8000, in the Washington, D.C. area.

Prompt and favorable consideration of this Amendment is respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit

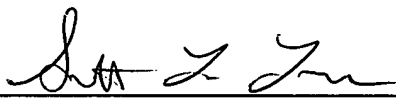
Application No.: 10/692,694
Art Unit 2862

Attorney Docket No. 0465-1068P
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Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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